

# FROM WOOL to CLOTH

*American Woolen Co.  
Boston, Mass.*



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FINISHED (LOTH. READY FOR THE CASE

# FROM WOOL *to* CLOTH



*Published by*  
**AMERICAN WOOLEN Co.**  
**BOSTON, MASS.**

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Copyright, 1911,  
AMERICAN WOOLEN CO.  
Boston, Mass.

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## INTRODUCTION

ONE hundred and fifty years ago, in the days of homespun, when spinning and weaving were a prominent part of each household's duties, the value and quality of cloth was a matter of common knowledge. Familiarity with the process of making fabrics brought a general acquaintance with cloth, that does not now exist.

Many persons today do not know the difference between worsteds and woollens—many more cannot distinguish between those of a good and those of an inferior grade. This ignorance of quality is not to be wondered at when we consider that what was once a part of household work has become a great national industry.

The inability to judge cloth is a matter not only detrimental to the interests of the consumer, but also to those of the manufacturer. No reputable manufacturer can afford to give the consumer less than the full value for his money; but that the consumer

## INTRODUCTION

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*may know that goods are as represented it is necessary that he should understand something about the process of manufacture and thus be assisted in determining the quality of the article.*

*Appreciating that knowledge brings discrimination, that discrimination means the selection and purchase of the best goods in any line, we have prepared a few facts as to the woolen industry of America, together with a short description of the manufacture of worsteds and woolens "From Wool to Cloth."*

*It will be appreciated that limitations of space make it impracticable to illustrate every process used in the manufacture of woolen and worsted cloth, but the text, we are confident, will make quite clear the general method of manufacture.*

AMERICAN WOOLEN CO.



## FROM WOOL *to* CLOTH

THE great clothing-wool-producing countries of the world are those of Australia, South America, the United States and South Africa.

The world's wool production for 1910 was estimated at 2,952,782,985 pounds, of which the United States was supposed to have raised about 321,362,750 pounds, over one-tenth of the total.

It is estimated that about two-thirds of the clothing wool used by American manufacturers is raised in the United States.

The largest producer of the best wool, that is of the finest fibre, is Australia, but

## *FROM WOOL TO CLOTH*

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much of the wool raised in the United States, particularly in Ohio, Pennsylvania and West Virginia, is of very fine quality—fairly rivalling that of Australia.

There is a great difference in the qualities of different wools. The wools from different countries differ, the wool raised on different breeds of sheep in the same country differ, and the wool raised on any single sheep is not all of the same value for manufacturing purposes.

The best wool in soundness of fibre, softness and evenness of length, comes from the shoulders and sides of the sheep.

When the fleece is removed from the sheep by a skillful shearer, the wool sticks together, and the whole fleece may be spread out like the skin of the animal. Each fleece is tied up separately, and the wool is shipped in bags or bales, containing from one hundred to five hundred pounds each.

## *FROM WOOL TO CLOTH*

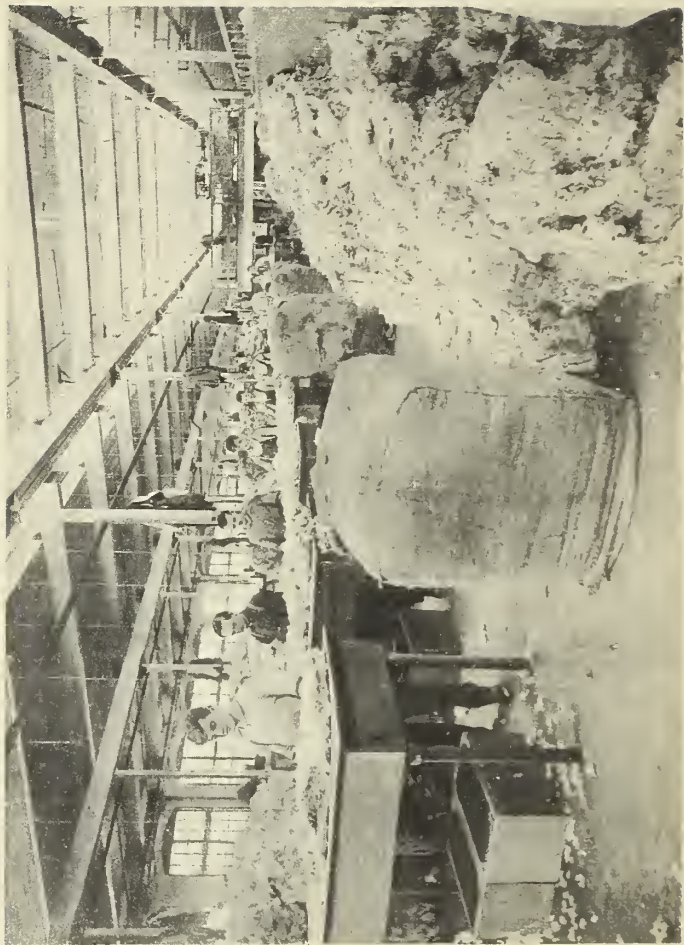
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When wool is received at the factory it is in fleeces, and each fleece contains different kinds of fibres—long and short—coarse and fine, and it is necessary that these should be sorted into different kinds or grades, as may be desired—perhaps six or eight different kinds, according to the particular uses to which the different qualities are to be put.

The fleece is spread out on a table, the center of which is covered with wire netting, and through this netting part of the dust and other matter from the wool falls while the sorting is going on. Sorters tear with the hands the different parts of the fleece from each other and separate them into piles, according to their different qualities.

All unwashed wool contains a fatty or greasy matter called *yolk*, which is a secretion from the skin of the sheep. The effect of this *yolk* is to prevent the fibres





WOOL SORTING

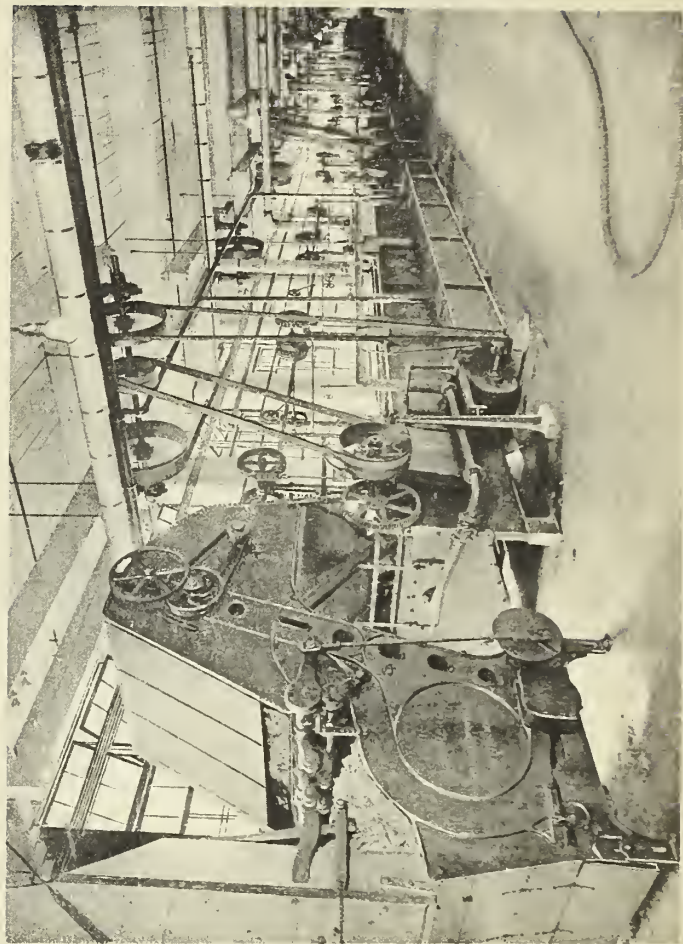


## FROM WOOL TO CLOTH

of the wool from matting, except at the ends, where, of course, it collects dust, and, forming a sort of a coating, really serves as a protection to the rest of the fleece while on the sheep's back.

After the wool is sorted it is next cleansed or scoured, in order to remove all this yolk, dirt and foreign matter, and this is accomplished by passing the wool, by means of automatic rakes, through a washing machine, consisting of a set of three or four vats or bowls, which contain a cleansing solution of warm, soapy water, until all the grease and dirt have been removed.

Each bowl has its set of rollers, which squeezes out the water from the wool before it passes into the next bowl. Having passed through the last bowl and set of rollers, the wool is carried on an apron made of slats on chains, to the drying chamber, called the dryer, where is taken out most of the moisture.



WOOL SCOURING

## *FROM WOOL TO CLOTH*

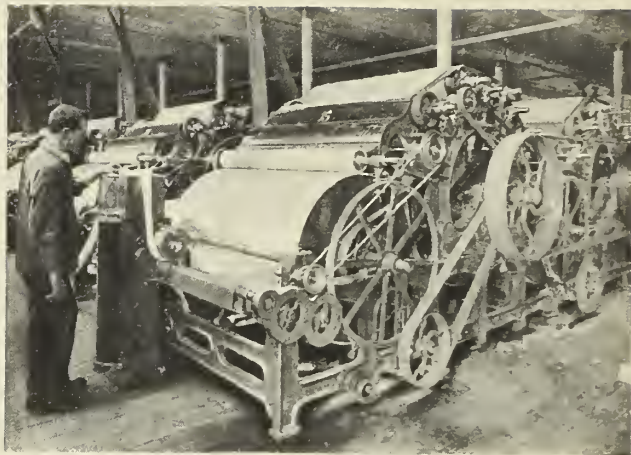
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The wool is now blown through pipes or carried on trucks to the carding room.

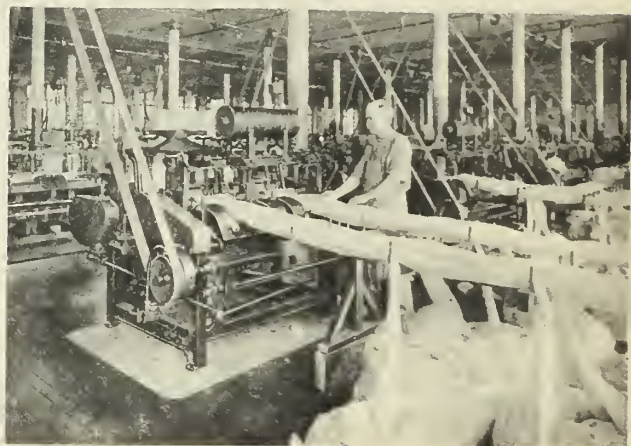
From this point the wool follows one of two different processes of manufacture—that of making into worsteds, or that of making into woolens.

Speaking in a general way, worsted fabrics are made of yarns in which the fibres all lie parallel, and woolens are made of yarns in which the fibres cross or are mixed. Ordinarily, worsteds are made from long staple wools, and woolens from short staple wools.





WORSTED CARDING



GILLING AFTER CARDING

## *FROM WOOL TO CLOTH*

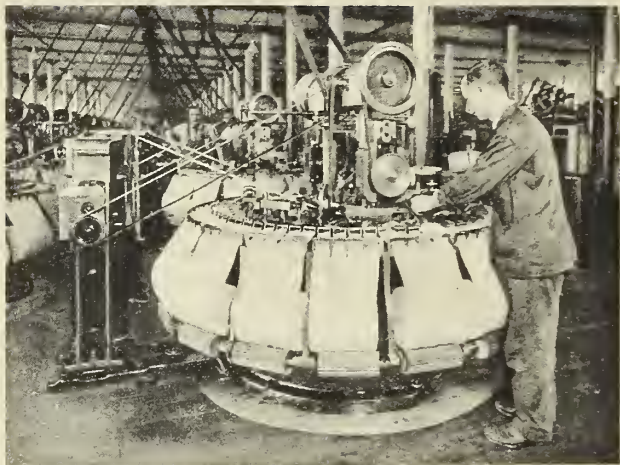
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### Worsted

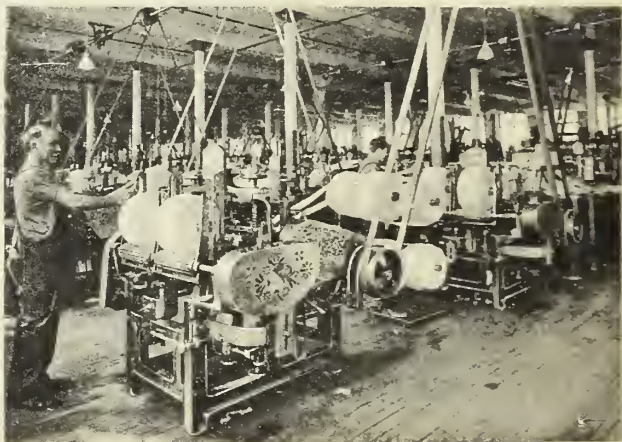
THE next process in the manufacture of worsteds is carding. In this process the wool is passed between cylinders and rollers, from which project the ends of many small wires. These cylinders revolve in opposite directions. The result is the opening, separating and straightening of the fibres; and the wool is delivered in soft strands, which are taken off by the doffer comb and wound upon a wooden roll into the shape of a large ball, known as a card-ball or card-sliver, or put into a revolving can. The sliver from a number of these balls or cans is now taken and put through what is known as the gilling machine, which to a degree straightens the fibres.

From the gilling machine the wool comes off in soft strands. Four strands are then taken to the balling machine





COMBING



GILLING AND MAKING TOP AFTER COMBING



## FROM WOOL TO CLOTH

where is made a large ball, ready for the combing. It takes eighteen of these balls to make a set or fill up the comb.

By means of the comb the fibre is still further straightened out, the short stock and noil, or nibs, are removed, and when the sliver comes from the combs most of the fibres are parallel to each other. A number of the slivers taken from the comb are then put through two further operations of gilling, and wound into a large ball, which is called a finished top.

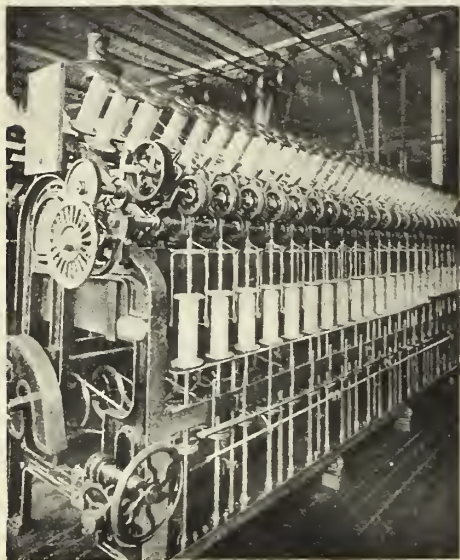
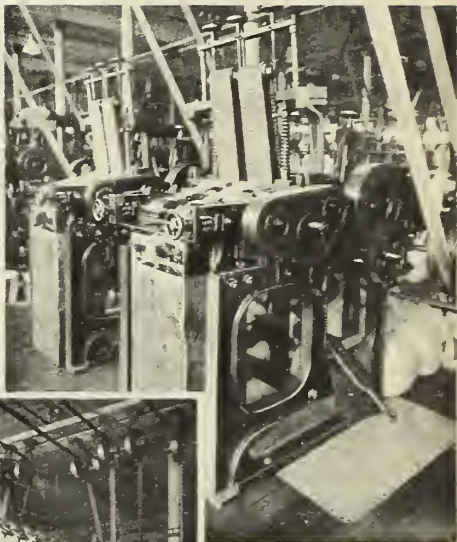
The dyeing is done in three ways—in the top, in the thread or skein after being spun, or in the piece after it is woven. If the wool is to be stock dyed—that is, dyed in the top—it is sent to the dyehouse to be dyed the shade required, and afterwards returned to be gilled and re-combed ready for the drawing.

Up to this point there has been no twist given to the wool, nor any appearance of

GILLING—

FIRST OPERATION

ENGLISH DRAWING



REDUCER—ENGLISH DRAWING

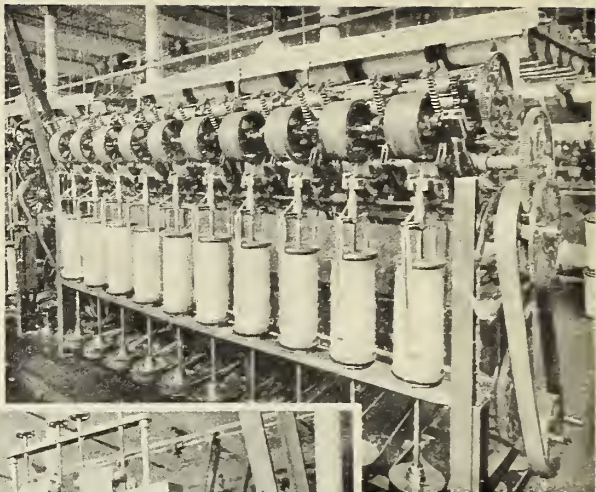
## FROM WOOL TO CLOTH

a thread. The top, the soft untwisted end, is now run through the drawing machine, the process sometimes consisting of nine distinct operations, and is drawn and redrawn until reduced to the size required for its special purpose; and the stock is then delivered to the spinning room on spools, and is called roving.

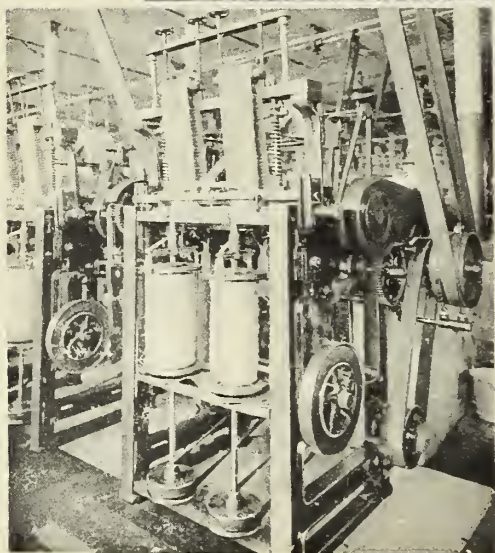
In the spinning the process of drawing continues until the twisted thread is reduced to the size required, which, either singly or twisted together in two, three or four strands, is to be used for weaving.

The yarn is then very carefully inspected, and all imperfections which would show in the finished goods are removed, and, if it is to be dyed in the skein, the yarn is taken to a reel, where the skeins are made ready for the dye-house.

The threads must now be prepared for the loom, in order that the actual



FINISHING BOX —  
ENGLISH DRAWING



GILLING —  
ENGLISH DRAWING

## *FROM WOOL TO CLOTH*

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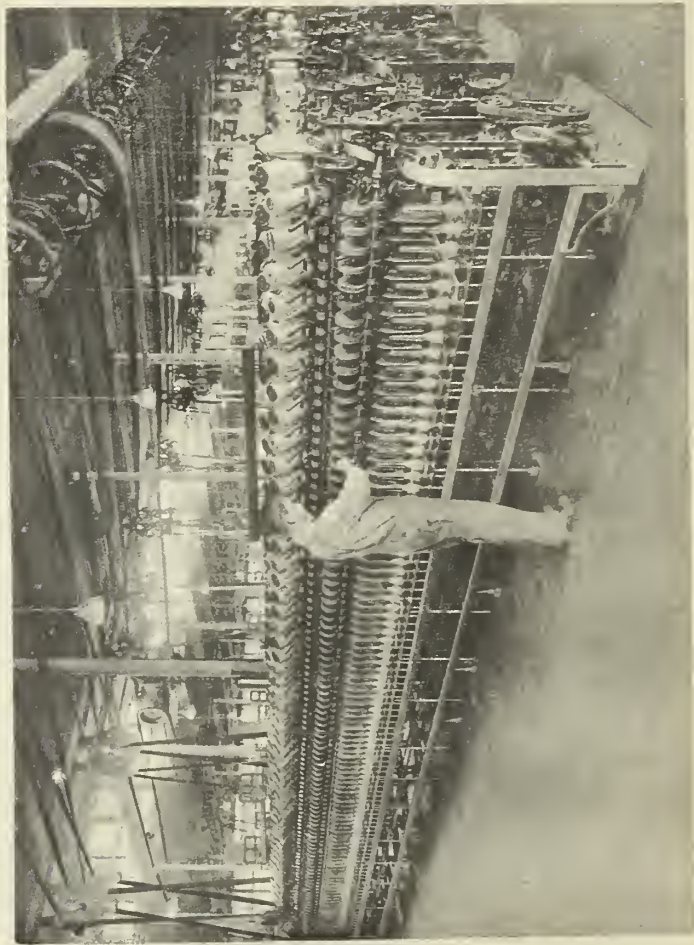
weaving may be done. The thread is used in two ways in weaving—as warp, which is the thread which runs lengthwise of the cloth, and as filling, or woof, which runs across the cloth from side to side.

The warp threads—the threads which run lengthwise of the cloth—are sized and wound upon large reels, and from these transferred to a large wooden roll called the warp beam, which holds all the warp threads, usually several thousands.

The filling threads are put on shuttle bobbins and placed in the shuttles to be refilled by the operatives as required, and as the weaving progresses.

The warp beam is then taken to the drawing-in room, where these several thousand threads are drawn through wire heddles in a frame called the harness, then drawn through a wire reed. The completed warp beam is now ready for the loom.



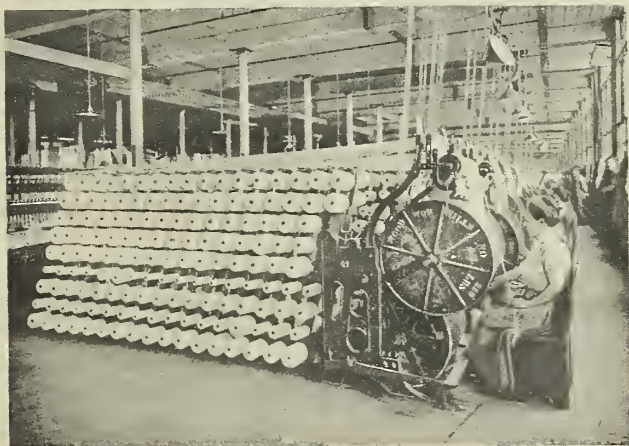


ENGLISH CAP SPINNING





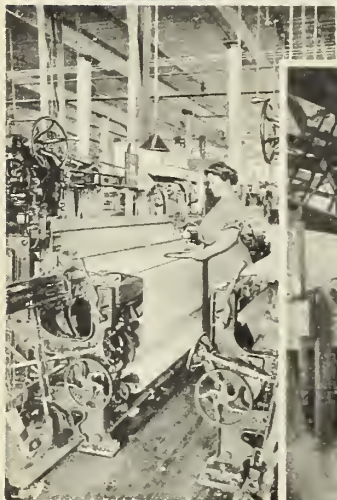
RING TWISTING



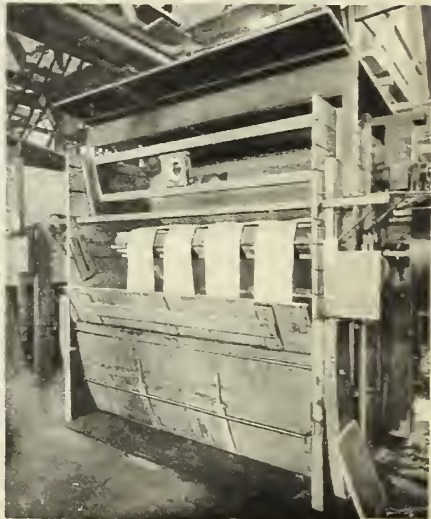
BEAMING AND YARN INSPECTING



DRAWING IN WARP THREADS



WEAVING



SCOURING CLOTH

## *FROM WOOL TO CLOTH*

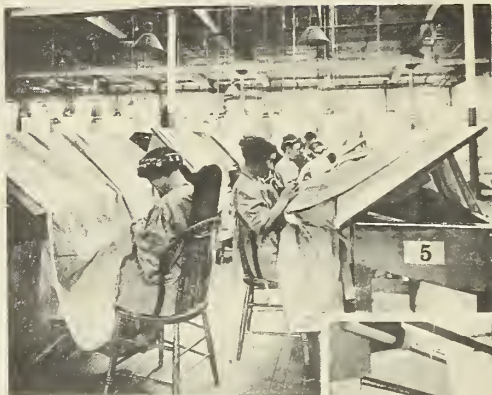
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The harnesses are placed in the loom, and by means of what is called the "head-motion," part of the threads are raised and part are lowered. This allows the filling shuttles to pass above some threads and below others, filling out the pattern required.

The cloth, having been made in such length as is desired, is taken from the loom, and, by what is known as burling and mending, any knots or threads woven in wrongly are removed, and any imperfections which have been discovered through a careful examination are corrected.

The web or cloth is scoured or washed and the oil and any foreign matter removed.

Undressed fabrics would now be fulled. This consists of running cloth through a fulling machine where, moistened with a specially prepared soap, it is subjected to a great pressure and pounding, which aids in giving the required finish.



MENDING ROOM



BURLING—RAISING KNOTS

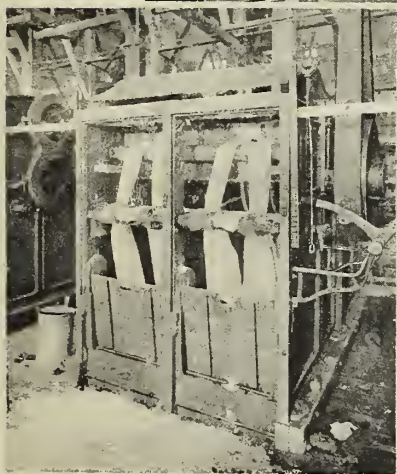


MENDING PEACHING

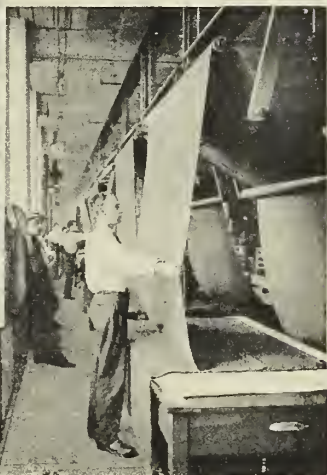




PIECE DYEING



FULLING CLOTH



FINISH PERCHING



## *FROM WOOL TO CLOTH*

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There are different kinds of finishes which require different treatments, and it would be impracticable for us to dwell in detail upon this matter here.

If dyed in the piece, the web or cloth is taken to the dyehouse and dyed. It is thoroughly rinsed, all moisture is extracted from it, and it is dried.

After drying, the cloth is run through a machine by which it is brushed and sheared, the brushing lifting the long fibres, and the shearing cutting them off at even length. The cloth is put through the press, which irons it out, giving it the lustre or the finish that is desired. It is examined again for further imperfections, and if such have occurred they are corrected.

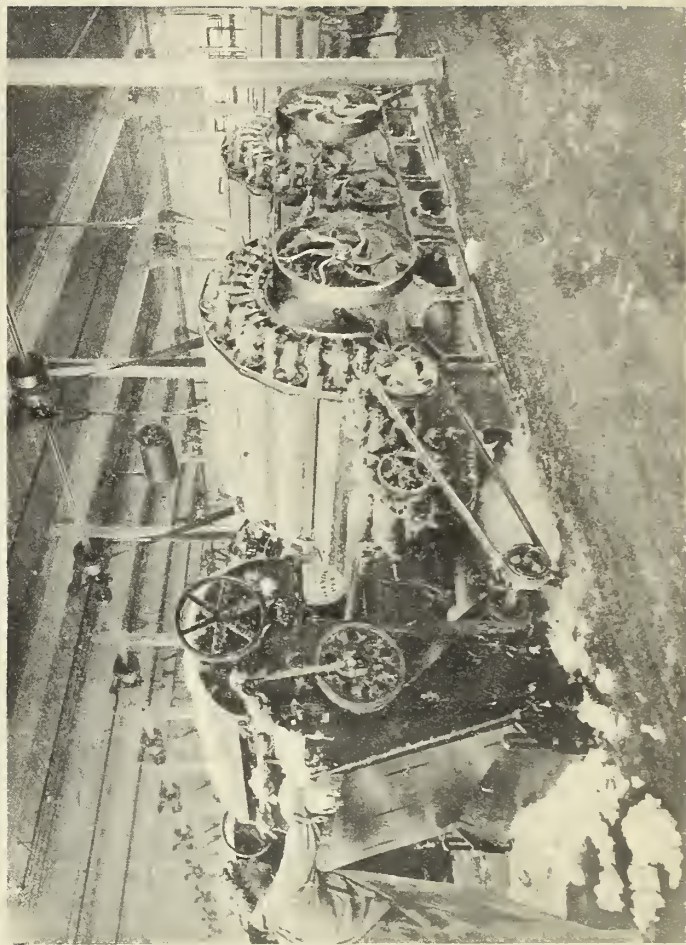
Measuring, weighing, rolling and tagging follow, and the cloth is packed and ready for the market.

## Woolens

**W**OOLENS are made from short staple wools, known as clothing wools, and in the finished woolens the fibres of the yarns cross or are mingled together. In the case of woolens, after the scouring, it is frequently necessary to remove burrs or other vegetable matter from the wool. To accomplish this the wool is dipped in a bath of chloride of aluminum or sulphuric acid solution, then the moisture is extracted and the wool is put through a drier, where the temperature must be at least 212 degrees. This heat carbonizes the foreign substance, but has little effect on the animal fibres of the wool.

Next, an ingenious machine called the burr picker removes the burr.

Sometimes there is to be a blend of the wool with other stocks, and in that



WOOLEN CARDING

## *FROM WOOL TO CLOTH*

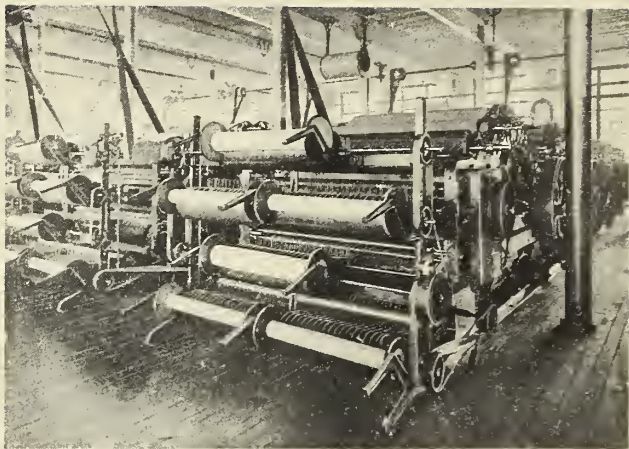
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case the several different wools are mixed together.

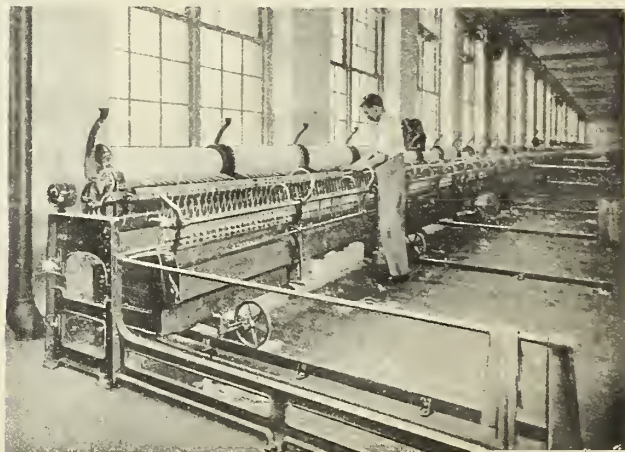
Dyeing of woolens is done in three ways—in the wool, in the thread after it is spun, or in the piece after it is woven. If the wool is to be “dyed in the wool” it is now conveyed to the dyehouse, dyed the shade required, then returned to the mixing room.

During the process of scouring, when the yolk was removed, a large part of the natural oil of the wool was also eliminated, and, in order to restore this lubricant, the wool is sprinkled with an oil emulsion, and the mixing picker thoroughly blends the wools.

From here the wool goes to the card-room, and by means of the carding machine the fibres are carded and drawn and delivered to the finisher in a broad, flat sheet. By means of the condenser it is divided into narrow bands, and the



FINISHER WOOLEN CARDING



WOOLEN MULE SPINNING



## *FROM WOOL TO CLOTH*

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wool—free as yet from twist—comes out in soft strands. These strands or threads are called roping.

Now comes the mule spinning. The roping passes through rolls by which it is drawn and twisted to the size required, and wound on paper cop tubes or bobbins. Such of the yarn as is to be used for warp is then spooled from the bobbins to dresser spools. It is sized and wound upon large reels; from these transferred to the warp beam, as in the case of worsteds.

The processes of drawing-in, preparation for weaving, burling and mending are practically the same as in the case of worsteds.

The finishing processes of woollens, like the finishing processes of worsteds, vary with different fabrics, some fabrics being scoured and cleansed in the washers before fulling, others going to the fulling



JACK SPOOLING



DYE KETTLE FOR DYEING  
SLUBBING AND YARN

## FROM WOOL TO CLOTH

mill without cleansing. After fulling, the cloth is again washed and rinsed, and if necessary to remove any vegetable fibres, it is carbonized.

Napping or gigging raises the fibres to the nap desired. Gigging is done by means of a wire napping machine or teasel gig, which raises the ends of the fibres on the face of the cloth. The teasel is a vegetable product about the shape of a pine cone, and it is interesting to note that no mechanical contrivance has ever been invented to equal it for the purpose.

The napping which has been raised by the teasel is sheared or cut to a proper length by machine. The cloth is pressed, and, if it is desired to finish it with lustre, it is wound upon copper cylinders and steam is forced through it at a high pressure.

Next the cloth is dyed, if it is to be piece-dyed—that is, dyed in the piece.

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If the cloth is a mixture, the wool was dyed immediately after the scouring. In worsteds the dyeing is done either just after it has been subjected to the first combing processes, or the yarn is dyed in the skein or hank.

. In the dry finishing the cloth is finished with various kinds of finishes desired, and it is steamed, brushed, sheared and pressed. Another examination for any imperfections or defects follows; the cloth is measured, packed and tagged and is ready for the market.



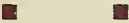
The difference between worsteds and woolens is principally that in the threads or yarns from which worsteds are made the fibres of the wool lie parallel, one to another, being made from combed wool, from which the short fibres have been

## *FROM WOOL TO CLOTH*

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removed; and woolens are made from yarns in which the fibres cross and are matted and intermixed. When finished the effect of worsteds and woolens is materially different. Upon examination it will be found that the worsted thread resembles a wire in evenness, while the woolen thread is uneven and irregular.

A worsted fabric when finished has a clear, bright, well defined pattern, seems close and firmly woven, and is of a pronounced dressy effect; while woolen cloths are softer, they are more elastic, the colors are more blended, the threads are not so easily distinguishable and the general effect is duller.





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## *About the* AMERICAN WOOLEN COMPANY

THE AMERICAN WOOLEN COMPANY is the largest manufacturer of woolens and worsteds in the world. It owns and controls 34 mills, employs 30,000 hands, has a payroll of \$13,000,000 annually and has a total output of all classes of fabrics of 50,000,000 yards per annum.

It is interesting to consider that the 50,000,000 yards of woolen fabrics made annually by the American Woolen Company would make a belt around the world, and would leave a length besides which would extend from Boston across the American continent, overlapping San Francisco and reaching many miles into the Pacific Ocean; if all the pieces of woolen fabrics made in a year by the

## *A M E R I C A N   W O O L E N   C O .*

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American Woolen Company were placed end to end this long strip would extend nearly one-eighth of the mean distance from the earth to the moon.

This Company buys all its wool and supplies of every kind direct. Its mills are fitted with the most modern and up-to-date machinery. Its designers are the most able that can be procured. The managers and superintendents are men of years of experience in the worsted and woolen manufacturing business—who know the business from beginning to end—and were chosen for their ability and knowledge.

This Company employs skilled help, and makes, in a large variety of patterns, woolen and worsted cloths for Men's Wear, Women's Wear and various purposes; but whatever the goods, they are among the best of all grades from the lowest to the highest priced.

## *A M E R I C A N   W O O L E N   C O .*

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Clear-sighted management and unequaled purchasing power, experienced buyers, able designers, efficient equipment, expert operatives, all these unite in producing goods unexcelled on an economical basis; thus the public is able to obtain in the products of the American Woolen Company the very best goods that can be made—goods made honestly and conscientiously from the best of materials and in the most attractive and fashionable designs—at the lowest prices compatible with the quality of the goods manufactured.

This Company has shown by its own manufactures that goods of as high quality and attractiveness, along its individual line, can be produced in America as anywhere in the world.



## A M E R I C A N   W O O L E N   C O .

### SELLING ORGANIZATION

**T**HE American Woolen Company does not sell its goods through commission houses, but through its own selling organization,

The headquarters of this great selling organization are in New York, with branches in all important trade centers.

Its New York salesrooms are in the American Woolen Company Building, which covers the block between Eighteenth and Nineteenth Streets on Fourth Avenue, New York City — a building erected with special reference to its serving as the New York home of The American Woolen Company and the headquarters of its distributing organization.

Something of the amount of detail necessary to properly transact the distributing, as well as the manufacturing,

## A M E R I C A N   W O O L E N   C O .

parts of this business may be appreciated when it is taken into consideration that more than 30,000 styles of fabrics are shown each season.

**I**T behooves you, it behooves every American, when buying cloth, ordering clothes from the tailor or purchasing cloth at the shop, to specify and call for the products of this Company.

THE AMERICAN WOOLEN  
COMPANY





The tabulations are given for the benefit of those who may be interested in the statistics of woolen manufacture.

## Magnitude of Woolen and Worsted Manufacture

Number of establishments . . . . .	913
Capital . . . . .	\$415,465,000
Cost of materials used . . . . .	\$273,466,000
Salaries and wages . . . . .	\$79,214,000
Miscellaneous expenses . . . . .	\$21,347,000
Value of product . . . . .	\$419,826,000
Value added by manufacture (products less cost of materials) . . . . .	\$146,360,000
Employees:	
Number of salaried officials and clerks . . . . .	5,325
Average number of wage-earners employed during the year . . . . .	162,914

## Wool Product of the United States

YEAR	POUNDS	YEAR	POUNDS
1891	307,401,507	1902	316,341,032
1892	333,018,405	1903	287,450,000
1893	348,538,138	1904	291,783,032
1894	325,210,712	1905	295,488,438
1895	294,296,726	1906	298,715,130
1896	272,474,708	1907	298,294,750
1897	259,153,251	1908	311,138,321
1898	266,720,684	1909	328,110,749
1899	272,191,330	1910	321,362,750
1900	288,636,621	1911	318,547,900
1901	302,502,382		

## Imports of Wool into the United States

YEAR	POUNDS	YEAR	POUNDS
1891	129,303,648	1902	166,576,966
1892	148,670,652	1903	177,137,796
1893	172,433,838	1904	173,742,834
1894	55,152,585	1905	249,135,746
1895	206,081,890	1906	201,688,668
1896	230,911,473	1907	203,847,545
1897	350,852,026	1908	125,980,524
1898	132,795,302	1909	266,409,304
1899	76,736,209	1910	263,928,232
1900	155,918,455	1911	137,647,641
1901	103,583,505		

## Wool Retained for Consumption in the United States

YEAR	POUNDS	YEAR	POUNDS
1891	435,848,459	1902	465,851,407
1892	452,562,140	1903	489,966,914
1893	501,141,748	1904	458,010,031
1894	397,193,069	1905	538,357,130
1895	524,722,428	1906	491,534,247
1896	512,235,982	1907	499,115,927
1897	614,626,136	1908	418,648,811
1898	389,322,582	1909	574,023,650
1899	329,361,558	1910	587,983,508
1900	420,197,228	1911	450,804,692
1901	388,430,059		

It will be noticed that the amounts mentioned in above table, in any one year, are not equal to the sum of the amounts given as "Imports of Wool into the United States" and "Wool Product of the United States" for the same year. This is accounted for by the fact that some of the wool which is imported, as well as some of the wool which is raised in this country, is exported and not used in the United States.











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